

Remarks:

I. Summary of Claimed Subject Matter

5 The present invention provides a modular computer system, including a cooling system. Under the invention, a multi-tiered support receives, a computer chassis configured for mounting in the multi-tiered support.

10 In a first variation of the invention, the computer chassis includes a plurality of computer components cooled by a plurality of respective cold plates using a coolant. The coolant is part of a closed loop cooling system, from which heat is dissipated by a heat exchanger. The closed loop cooling system is configured to cool first and second computer components in parallel, and a control system is configured to control the relative rate of coolant flow to the first and second computer components.

15 In a second variation of the invention, the heat exchanger includes a first heat-exchanger portion and a separate second heat-exchange portion. The first and second heat-exchanger portions each have coolant passageways having two ends. The first heat-exchanger portion coolant passageways are separated from coolant passageways of the second heat exchanger portion by one or more of the plurality of cooling devices at each end of the heat-exchanger passageways.

20 In a third variation, the heat exchanger is in turn cooled with a fluid. The fluid is received by the computer chassis from the multi-tiered support via a connection. The computer chassis includes passageways configured for cooling the heat exchanger with the fluid received from the connection.

II. Grounds of Rejection

1. The drawings were objected to as allegedly not showing the reference numbers 901, 903, 905 and 907.

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2. The drawings were further objected to as allegedly showing the reference numbers 191, 193 and 195, which are not discussed in the specification.

10 3. The drawings were further objected to as allegedly failing to show the claim feature of a control system.

4. The drawings were further objected to as allegedly failing to show the claim features of a heat sink external to the chassis.

15 5. The disclosure was objected to as allegedly failing to discuss FIGS. 10 and 11, along with their reference numbers.

20 6. Claims 1-12 and 16-20 were rejected under 35 U.S.C. § 112, as allegedly being vague and indefinite because the control system to control relative rate of coolant flow is insufficiently disclosed and is not shown in the drawings.

25 7. Claims 30-37 were rejected under 35 U.S.C. § 112, as being vague and indefinite because the subject matter allegedly has not been described or properly shown in the drawings. With respect to this rejection, reference is made to the aforementioned objection to the disclosure in ground 5.

8. Claims 1, 2, 5-7, 9, 10, 12, 16, 17-19, 20, 27 and 30-37 were rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Novotny et al. in view of Cheon

30 9. Claims 3 and 4 were rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Novotny et al. in view of Cheon, and further in view of Wu.

10. Claim 8 was rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Novotny et al. in view of Cheon, and further in view of Casebolt.

11. Claims 38 and 39 were rejected under 35 U.S.C. § 102(e), as allegedly 5 unpatentable over anticipated by Cheon.

III. Rejections and Objections Previously Addressed

10 Applicants respectfully note that their Amendment filed November 21, 2005, addressed a number of the issues raised above. In that Amendment, Applicants added figures 10 and 11, along with amendments to the specification that referenced these figures and their figure numbers.

15 More particularly, the following grounds of objection / rejection are fully addressed by the Amendment filed November 21, 2005, as described below.

20 Ground 3. (drawings objected to as allegedly failing to show a control system): Fig. 10 depicts control system 521, which is described in the paragraph beginning at page 20, line 6 of the specification (as amended on page 3 of the Amendment filed November 21, 2005).

25 Ground 5. (disclosure objected to as allegedly failing to discuss FIGS. 10 and 11, along with their reference numbers): Figs. 10 and 11 and there reference numerals are described in the paragraphs beginning at page 17, line 9, page 19, line 9, and page 20, line 6 of the specification (as amended on pages 2 and 3 of the Amendment filed November 21, 2005).

30 Ground 7. (claims 30-37 rejected as being vague and indefinite because the subject matter allegedly has not been described or properly shown in the drawings): This ground of rejection referred back specifically to the objection of Ground 5. Just as the objection was addressed by the Amendment filed November 21, 2005, so to is the rejection of claims of Ground 7.

For the aforementioned reasons, applicants respectfully request that the rejections and objections of grounds 3, 5 and 7 be withdrawn.

5 **IV. Present Amendment to the Specification**

10 The drawings were objected to as having reference numerals not referred to in the specification (Ground 1), and as not having reference numerals referred to in the specification (Ground 2). The clerical error leading to these related grounds of objection have been addressed by the present amendments to the specification. No new matter is added by these Amendments.

15 The drawings were further objected to as failing to show a heat sink external to the plurality of chassis (Ground 4). The amended specification recites that "the modular rack liquid loop could include a heat sink 191 that is external to the plurality of chassis" (as depicted in FIG. 12), and thus addresses this ground of objection.

20 Claims 1-12 and 16-20 were rejected as allegedly vague and indefinite because the control system to control relative rate of coolant flow allegedly is insufficiently disclosed and is not shown in the drawings (Ground 6). Per the Amendment filed November 21, 2005, Fig. 10 depicts control system 521, as described in the paragraph beginning at page 20, line 6 of the specification (amended on page 3 of the Amendment filed November 21, 2005), and the paragraphs beginning at page 20, lines 14 and 22 of the specification. This disclosure provides a wide variety of operational parameters that the control system can control, and refers specifically to cold plates 195 arranged in parallel, wherein the tubing is configured with valves 197 or supplementary pumps such that the rate of rate of flow between parallel branches of the cooling system can be separately and individually controlled.

25 For the aforementioned reasons, applicants respectfully request that the rejections and objections of grounds 1, 2, 4 and 6 be withdrawn.

V. Ground 8: Obviousness over Novotny et al. in View of Cheon

A. Claims 1, 2, 5-7, 9, 10, 12 and 16-20 are patentable over Novotny et al. in view of Cheon

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Independent claim 1 recites (in part):

a control system configured to control the level of cooling provided to the first and second computer components;

wherein the cooling system is configured to deliver coolant to the first and second computer components in parallel; and

wherein the control system is configured to control the **relative rate of coolant flow** to the first and second computer components. [Emphasis added].

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Similarly, independent claim 16 recites (in part):

a control system configured to control the level of cooling provided to the first and second computer components;

wherein the control system is configured to control the **relative level of cooling** between the first and second computer components.

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[Emphasis added].

Furthermore, independent claim 17 recites (in part):

controlling the **relative level of cooling** between the first and second computer components. . . . [Emphasis added].

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The Office Action correctly identifies that Cheon discloses a water cooling type cooling system for an electronic device, including a distribution device 30 having a plurality of ports so that a plurality of coolant circulation units 10 can be connected to a coolant supply unit 20 in parallel (see, [0054]). The cooling system includes a controller 30 that controls the rotation speeds of heat-dissipating fans to 21 and circulation pumps 23 (see, [0067]). The circulation pumps 23 are installed in the coolant supply unit 20, and are thereby isolated from the electronic device 1 (see, [0047]).

5 Cheon fails to disclose a control system configured to control the relative rate of coolant flow (or relative level of cooling) between first and second computer components. Figure 8 of Cheon clearly depicts the parallel configuration of the coolant circulation units 10 being separate from the heat-dissipating fans and the circulation pumps. Because the control system is only disclosed as controlling the heat-dissipating fans and the circulation pumps, and because the heat-dissipating fans and the circulation pumps are not configured to control the relative rate of coolant flow between the coolant circulation units, the control system cannot be configured to control the relative rate of coolant flow between the first and second computer components, and thereby, to control the relative level of 10 cooling between the first and second computer components.

Because Cheon fails to teach or suggest a control system configured to control the relative rate of coolant flow or the relative level of cooling between first and second computer components, the office action fails to establish a *prima facie* case of obviousness for independent claims 1, 16 or 17. Dependent claims 2, 5-7, 9, 10, 12 and 20 incorporate the limitations of independent claim 1, and dependent claims 18 and 19 incorporate the limitations of independent claim 17. Accordingly, the rejection of claims 1, 2, 5-7, 9, 10, 12 and 16-20 under 35 U.S.C. § 103(a) is improper, and Applicants respectfully request it be withdrawn.

20 B. Claim 27 is patentable over Novotny et al. in view of Cheon

As depicted in figure 7, independent claim 27 recites (in part):

25 wherein the heat exchanger includes a first heat-exchanger portion and a second heat-exchange portion, the first and second heat-exchange portions having coolant passageways **separated from one another** at both of two different ends **by one or more of the plurality of cooling devices**.
[Emphasis added].

30 Referencing figure 15, the Office Action alleges that Novotny et al. discloses first and second heat exchange portions having coolant passageways separated from one another at both ends of two different ends by the cooling device 138. Applicants respectfully traversed this allegation. As noted in column 10, starting at line 33, figure 15

depicts a mounting plate 138 (coupled to an integrated circuit) connected to a heat sink 134 via a heat conductor 139. Clearly, they heat conductor 139 serves as a thermal conduit to the heat sink. There is no disclosure or suggestion that a cooling device separates the coolant passageways of two heat exchanger portions.

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Because Novotny et al. fails to teach or suggest first and second heat-exchange portions having coolant passageways separated from one another at both of two different ends by one or more of the plurality of cooling devices, the office action fails to establish a *prima facie* case of obviousness for claim 27. Accordingly, the rejection of claim 27 under 35 U.S.C. § 103(a) is improper, and Applicants respectfully request it be withdrawn.

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C. Claims 30-37 are not unpatentable over Novotny et al. in view of Cheon

Independent claim 30 recites (in part):

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a multi-tiered support configured with a plurality of connections for connecting to a plurality of computer chassis, wherein the multi-tiered support defines passageways configured to deliver the fluid to each computer chassis connection;

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a computer chassis configured to mount in the multi-tiered support, being configured to connect to a connection of the plurality of connections, and to receive the fluid from the connection; . . . and

wherein the computer chassis includes passageways configured for **cooling the heat exchanger with the fluid** received from the connection. [Emphasis added].

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Novotny and Cheon fail to disclose a computer component cooled with a liquid coolant by a cold plate, the liquid coolant being cooled in a heat exchanger, wherein the heat exchanger is cooled by a fluid provided from a connection leading to passageways within a multi-tiered support. Because the cited art fails to teach or suggest the computer chassis including passageways configured for cooling the heat exchanger with the fluid received from the connection, the office action fails to establish a *prima facie* case of obviousness for claim 30. Dependent claims 31-37 incorporate the limitations of independent claim 30. Accordingly, the rejection of claims 30-37 under 35 U.S.C. § 103(a) is improper, and Applicants respectfully request it be withdrawn.

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VI. Ground 9: Obviousness over Novotny et al. in View of Cheon, and Further in View of Wu.

5 Dependent claims 3 and 4 incorporate the limitations of independent claim 1. For the reasons recited above with respect to claim 1, the rejection of claims 3 and 4, under 35 U.S.C. § 103(a), is improper. Applicants respectfully request it be withdrawn.

10 **VII. Ground 10: Obviousness over Novotny et al. In View of Cheon, and Further in View of Casebolt.**

15 Dependent claim 8 incorporates the limitations of independent claim 1. For the reasons recited above with respect to claim 1, the rejection of claim 8, under 35 U.S.C. § 103(a), is improper. Applicants respectfully request it be withdrawn.

VIII. Ground 11: Anticipation by Cheon.

20 Similar to the recitation of independent claim 1, independent claim 38 recites that the control system is configured to control the relative rate of coolant flow to the first and second computer components. Dependent claim 39 incorporates the limitations of independent claim 38. For the reasons recited above with respect to claim 1, the rejection of claims 38 and 39, under 35 U.S.C. § 102(e), is now improper. Applicants respectfully request it be withdrawn.

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IX. CONCLUSION

In view of the foregoing, Applicants respectfully request that a timely Notice of Allowance be issued in this case.

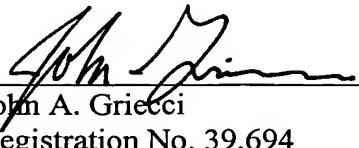
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Respectfully submitted,

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